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(54) Gas turbine engine nose cone

(57) The cone comprises a deformable hemispherical outer member 22, and a dished rigid inner member 27, a pressurized fluid being supplied therebetween.

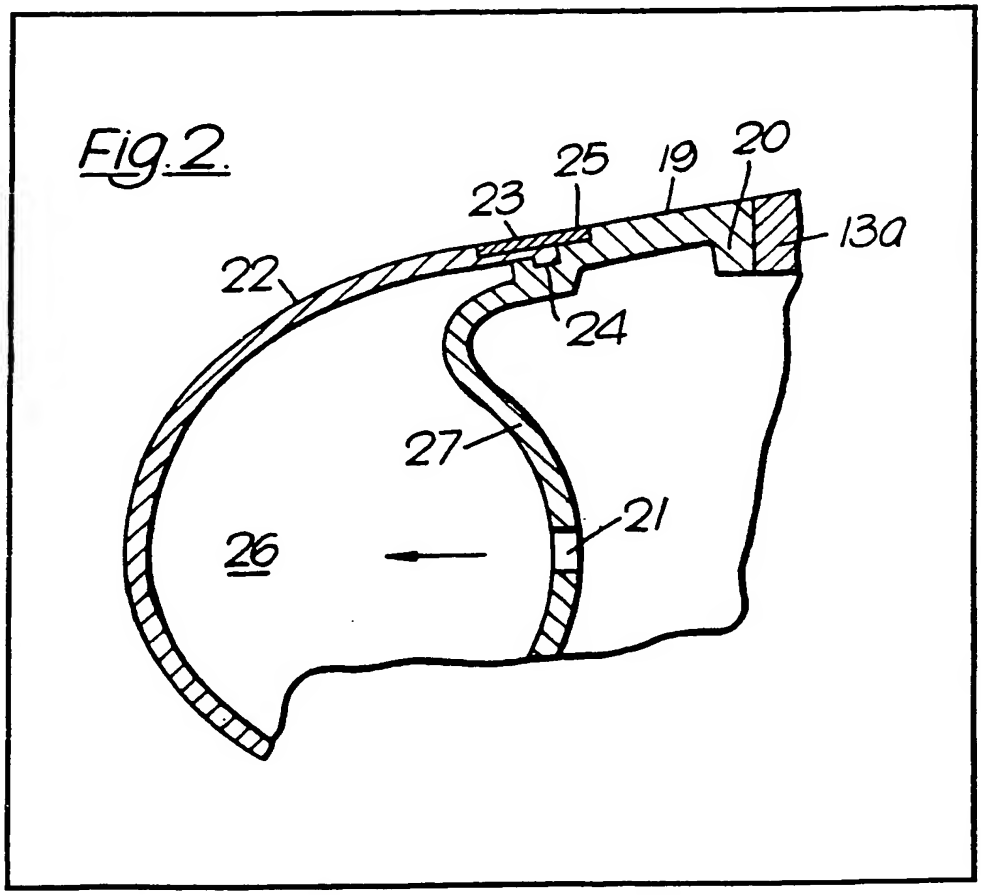

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Fig.1.

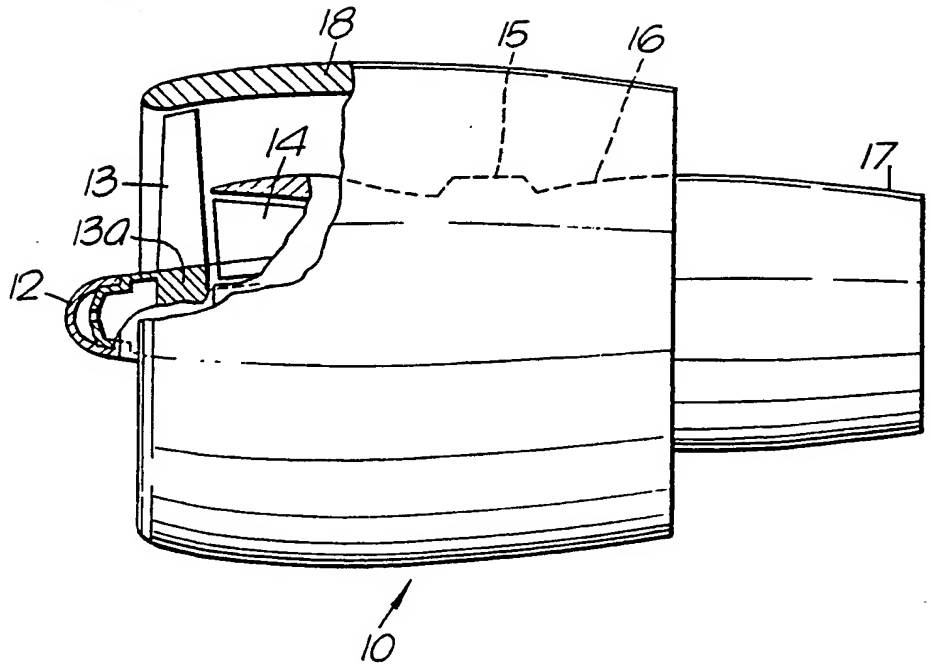
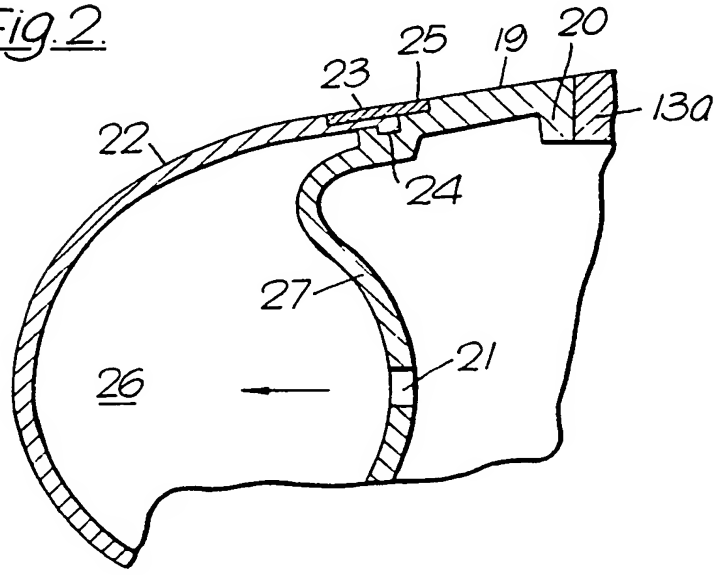


Fig.2.



SPECIFICATION

Improv ments in r r lating to gas turbin engines

This invention relates to nose cone and more particularly a nose cone suitable for use on a gas turbine jet propulsion engine.

It has been well known in the past to apply an aerodynamically shaped nose cone to the foremost projecting shaft portion of gas turbine jet propulsion engines. However these have usually been manufactured from a material such as sheet metal. This has resulted in two major problems, firstly the nose cone can sustain severe damage if in collision with an object such as a large bird. Secondly it is prone to icing-up when the engine is in operation, it is therefore usually necessary to provide some type of anti-icing apparatus for the nose cone.

It is felt that by use of an embodiment of the present invention the two abovementioned problems will be substantially overcome.

According to the present invention a gas turbine engine nose cone comprises a deformable outer member and a rigid inner member a supply of pressurized fluid being provided between the two members.

The deformable outer member comprises a substantially semi-spherical member made from fibre reinforced rubber.

Preferably the fibre reinforcement comprises glass fibres alternativiely the rubber member is reinforced with steel wire.

Preferably the rigid inner member comprises a substantially dished disc member.

Furthermore the pressurised fluid provided between the two members comprises a supply of high pressure air tapped from the compressor section of the engine.

Preferably the deformable member is provided with a radially inwardly extending bead which locates within a groove provided upon the innner rigid member.

The deformable member may be provided with an outer skin of polyurethane.

In one embodiment of the invention the deformable member is secured by means of an annular member which encircles a portion of the deformable annular member.

An example of the invention will now be described with reference to the accompanying drawings, in which:–

Figure 1 shows a diagrammatic view of a ducted fan type jet propulsion engine having a cut-away portion showing a schematic embodiment of the invention.

Figure 2 shows an enlarged view of the cut-away portion shown at Fig. 1.

Referring to Fig. 1 a ducted fan gas turbine engine shown generally at 10 comprises nose cone 12, fan 13, compressor section 14, combustion equipment 15, turbine section 16 terminating in exhaust nozzle 17. The fan 13 and compressor section 14 being rotatably mounted upon a common shaft arrangement (not shown) with the turbine section 16. Arranged outwards of fan 13 is an annular fan duct 18.

Fig. 2 shows an enlarged cross-sectional view of the nose cone 12 shown at Fig. 1 and comprises a rigid dish member 19 which is provided with radially inwardly extending flange portion 20 by means of which members 19 is secured to a mounting member 13*a*. The rigid member 19 is provided with an aperture 21 through which a supply of high pressure air is allowed to pass from the engine compressor section 14.

Arranged radially outward of the rigid member 19 is a substantially semi-spherical deformable rubber member 22 which is adapted to be located with respect to the rigid member 19 by means of an annular bead 23 arranged to the deformable member 22, which is engaged within the circumferentially extending groove portion 24 provided upon the rigid member 19. The bead member 23 is kept into close engagement with the circumferentially extending groove portion by means of annular clamp 25 which is disposed upon a portion of the outer periphery of the deformable member 22.

For satisfactory operation of the deformable member 22 it has been found desirable to provide the deformable rubber member 22 with a reinforcement which may take the form of a plurality of steel wires or glass fibre members (not shown in the drawings) the construction of the rubber and fibre being of a similar design to that of a motor car tyre.

In operation a supply of high pressure air is provided from the engine compressor 14 and communicates with space 26 *via* aperture 21 thus pressurising the deformable rubber member 22.

It will be appreciated that if the nose cone is in collision with a foreign body such as a heavy bird whilst the engine to which it is attached is in operation, the deformable member 22 and the high pressure air will tend to absorb a substantial amount of the force imparted by the projectile. The deformable rubber member 22 is protected from tearing or cutting if completely flattened by the provision of portion 27 of the rigid member 24. The deformable rubber member 22 will also tend to deflect any foreign body radially outwards and so into the fan portion 13 of the engine 10.

It is also envisaged that the d formable rubber memb r 22 will be provided with a polyurethane outer skin as a necessary protection against rain erosion.

CLAIMS (15 Nov 1978)

1. A gas turbine engine nose cone comprising a deformable outer member and a rigid inner member, a supply of pressurised

fluid being provided between the two members.

2. A gas turbine engine nose cone as claimed in claim 1 in which the deformable outer member comprises a substantially semi-spherical member made from fibre reinforced rubber.

3. A gas turbine engine nose cone as claimed in claim 2 in which the fibre reinforcement comprises glass fibres.

4. A gas turbine engine nose cone as claimed in claim 2 in which the fibre reinforcement comprises steel wire.

5. A gas turbine engine nose cone as claimed in claim 1 in which the rigid inner member comprises a substantially dished disc member.

6. A gas turbine nose cone as claimed in claim 1 in which the pressurised fluid provided between the two members comprises a supply of high pressure air tapped from the compressor section of the engine.

7. A gas turbine engine nose cone as claimed in claim 1 in which the deformable member is provided with a radially inwardly xtending bead which is located within a groove provided upon the inner rigid member.

8. A gas turbine engine nose cone as claimed in claim 1 in which the deformable member is provided with an outer skin of polyurethane.

9. A gas turbine engine nose cone as claimed in any preceding claim and substantially as hereinbefore described by way of example only with reference to the accompanying drawings.

CLAIMS (19 March 1979)

1. A gas turbine engine nose cone comprising a substantially semi-spherical deformable fibre reinforced outer member, and a rigid substantially dished shaped inner member, a supply of pressurized fluid being provided therebetween.

2. A gas turbine engine nose cone as claimed in claim 1 in which the deformable outer member is made from fibre reinforced rubber.

3. A gas turbine engine nose cone as claimed in claim 1 and 2 in which the fibre reinforcement comprises glass fibres.

4. A gas turbine engine nose cone as claimed in claims 1 and 2 in which the fibre reinforcement comprises steel wire.

5. A gas turbine engine as claimed in claim 1 in which the pressurised fluid provided between the two members comprises a supply of high pressure air tapped from the compressor section of the engine.

6. A gas turbine engine as claimed in claim 1 in which the deformable member is provided with a radially inwardly extending bead which is located within a groove provided upon the inner rigid member.

7. A gas turbine engine nose cone as claimed in claim 1 in which the deformable member is provided with an outer skin of polyurethane.

8. A gas turbine engine nose cone as claimed in any preceding claim and substantially as hereinbefore described by way of example only and with reference to the accompanying drawings.

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